

CONTRIBUTION OF MULTI-PURPOSE PUMPKIN (*Cucurbita moschata* Duch.) TO THE ECONOMY OF SELECTED KENYAN SMALL-SCALE HOUSEHOLDS

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ABSTRACT

Kenya's agricultural sector has generally been affected by repeated delays in rains that suppress farming. Farmers should therefore grow other non-staple crops which can do well with minimal rainfall. Pumpkin is one such crop that is drought-tolerant and requires very little care and labour. Majority of households do not utilize pumpkins regularly, although it is a multi-purpose food crop capable of forming basis for income and various commodities, including snacks, bakery products, and infant weaning foods. The present study established pumpkin's socio-economic impact in households and extent of cultivation and sale. A cross-sectional survey using a semi-structured questionnaire was administered to 385 households in Nyeri County of Kenya. Results showed that majority of households earned low income, with 56.3% earning less than KSh. 12,000 per month. Pumpkin was grown by 71.4% of the households, but contributed to livelihoods of only 4.2% households. There was a high correlation between the number of pumpkin plants cultivated and amount of income received from pumpkin sale, $r(16)=0.510$, $P=0.043$. Pumpkin fruits contributed very little to income of the households and were not yet tapped to improve food security and livelihood of people in the area. Improving marketability of pumpkin could increase its demand, production level and sale to generate income for many resource-poor households.

Key words: Food security, Fruits, Income, Kenya, Nutrition security, Socio-economic impact

INTRODUCTION

It is estimated that more than half of Kenya's population of approximately 40 million people is poor, with 7.5 million of the poor living in extreme poverty (RoK, 2008). In 2007, the number of poor people in Kenya was estimated to be 18.2 million, rising to 19.5 million and later 20.1 million in 2008 and 2010, respectively. Especially rampant is the poverty levels in arid areas which are characterized by harsh weather conditions, which are reported to raise poverty levels to above 70%.

The agricultural sector has been a key driver of economic growth in Kenya for the last four decades and is the main source of livelihood (employment, income and food security) for more than 80% of Kenya's population living in rural areas. Agriculture is the single largest sector of the economy contributing to about a quarter (25%) of the country's GDP and accounting for 65% of export earnings (KER, 2013). It has been documented that majority of the poor (three out of four poor people) live in rural zones. Most Kenyans live in medium to high potential for agriculture areas, which comprise about 18% of the country's territory (Uwechue, 1996).

Previous reports show that low income is one of the most important factors of poverty that defines the poor. In terms of the poverty gap, poor people in rural areas have, on average, much lower incomes

compared to the poverty line, and their income distribution does not seem to change much over the years. The fight against poverty remains a top priority on Kenya's development agenda whereby the government commits to eliminate poverty by the year 2030. Agriculture is the largest employer in the economy and to realize the desired annual economic growth rate, there is need to transform smallholder agriculture from subsistence to an innovative, commercially-oriented and modern agricultural enterprise (KER, 2013).

The frequent food insecurity in most parts of Kenya is due to over-reliance on a few staple foods like maize and potatoes, and arises from repeated cultivation of the same crops in the same farms (RoK, 2001). The recent erratic weather pattern characterized by short rainfall in some ecological zones, especially grain growing regions has caused a deceleration in agricultural sector, which saw a drop from 4.2% in 2012 to 2.9% in GDP in 2013. There was depressed production of maize, beans and coffee among other export crops (RoK, 2014). On the contrary traditional food crops including pumpkins, which are rich in nutrients, are so far not highly regarded by the smallholder farmers.

Pumpkin (*Cucurbita moschata* Duchesne) is among the most important food crops with high potential to overcome undernourishment and food insecurity

(Ondigi *et al.*, 2008). It is a drought-tolerant fruit and leafy vegetable that thrives well in most parts of Kenya (Muendo and Tschirley, 2004). Previous studies have indicated vast potential of pumpkin production and utilization in food poverty reduction in some regions of Kenya. A study by Ondigi *et al.* (2008) revealed that pumpkin is neither a priority food crop cultivated and used to generate income among the communities living around Lake Victoria Basin in Kenya. There exists favourable ecological conditions necessary for cultivation of the pumpkin, but only small portions of land are devoted to pumpkin cultivation and these are mainly cultivated as a marginal crop often on the edges of field crops or scantily scattered between staple crops such as maize or sorghum. Furthermore, research done on pumpkin is inadequate compared to most mainstream and exotic crops (Hamisy *et al.* 2002). Utilization and improvement of productivity through cultivation of under-utilized crops such as pumpkin would help reduce their genetic erosion (Chweya, 1997).

Pumpkin fruits are rich in carbohydrates, proteins and antioxidant activities. Antioxidants are required to boost the human body immunity against cancer and other deadly diseases. They are also rich sources of vitamin A present as beta-carotene, unsaturated fatty acids and amino acids arginine, aspartate and glutamic acid (Usha *et al.*, 2010). They are rich in vitamins B1, B2, B12, C and E, and minerals zinc, niacin, iron, magnesium, phosphorus, potassium, folate and calcium. This potential is unbeaten by any other single crop (Encyclopedia of Foods, 2004).

Pumpkin is not as bulky as tuber crops such as the yam, and can be used as a breakfast food. It matures in only four months, can grow in any part of East Africa and can be stored for as long as 8 months without going bad (Hamisy *et al.*, 2002). Moreover, pumpkin production is less labour intensive, but more profitable compared to yam and many other staple crops (Oloyede *et al.*, 2013).

MATERIALS AND METHODS

A cross-sectional survey was carried out in 385 households in Nyeri County of Kenya between 11th and 22nd February 2014 to determine contribution of pumpkin to the economy of the households. The household sample size representative of study population was determined using the criteria of $\pm 5\%$ Precision Level (e), Confidence Level of 95% and Degree of Variability of $P=0.5$ (Israel, 1992).

Using County Agricultural Offices records, a population of 10,000 farmers in the study area gave a sample size of 385 farmers. Purposive sampling was

done to select Nyeri County for this particular study due to the presence of a farmers' support project on the ground. The County has six Constituencies, 12 Divisions and 24 Locations. Multi-stage random sampling was applied to determine the areas to be visited, whereby the six Constituencies were written on papers, folded and two Constituencies were randomly picked. The same was done for the 12 divisions, to end up with two Divisions (one Division per Constituency) and two Locations (one Location per division). All Sub-locations in each Location were listed and households in the villages visited until the required number of households for the sub-location was attained. The number of households per sub-location was determined using Population Proportionate to Size (PPS) method. The population sizes were obtained from offices of the local authority (Chief). The study population involved farmers and respondents were mothers assumed to have information on both the farming activities and sale of farm produce. The mothers were better placed to provide reliable information on production and marketing of pumpkin fruits.

Respondents were interviewed using a semi-structured questionnaire to determine demographic characteristics of households, cultivation levels of pumpkin and pumpkin contribution to household income. A Research Assistant well conversant with the language of the natives was trained on research ethics, interviewing techniques and data collection, and proper translation of the questionnaire.

Then one-day pilot survey was done in a sample other than in the study area, among 19 households (5% of the study sample size). The data was then entered and the tool tested for reliability. The pre-testing also helped the Research Assistant to familiarize with the tool, understand the process of interviewing and the research objectives. Before receiving the day's questionnaires, they were checked for completeness and any inconsistency confirmed to disregard the incomplete ones.

The questionnaire was coded and data entry and analysis was done using SPSS version 17 for descriptive statistics, including percentages or frequencies of the responses. Chi-square analyses were performed to determine the relationship between monthly income levels and a number of demographic characteristics including education level of the household head. Pearson's correlation was used to determine association between the extent of pumpkin cultivation and income from sale of pumpkin fruits.

RESULTS

Demographic Characteristics

Prior to collecting information on agriculture and income from farming, a number of household characteristics were established, including household size, sex of household head, occupation of household head and main livelihood source. These characteristics helped in data interpretation and drawing of inferences. Results showed that the mean household size was 3.9 (SD 1.77). Most households (76.4%) were male headed, while 23.6% were female headed. Majority of household heads either did not complete secondary education or dropped from upper primary school (Table 1). Most of the households earned a livelihood through mixed farming followed by crop sale, which corresponded to 30.1% and 28.3%, respectively.

Socio-Economic Status

Most households (29.1%) had a monthly income of between KSh. 1,000 and KSh. 6,000 and only 1.9% earned KSh. 100,000 and above (Figure 1).

There was a significant relationship between education level of the household head and the amount of monthly income earned from all sources, χ^2 (N=380) =168.05, $P=0.000$. Households with the highest income levels were male-headed. None of the female headed households earned an income of more than KSh. 80,000 (Figure 2).

There was a significant relationship between the sex of household head and the category of income earned in the household, χ^2 (N=380) =28.48, $P=0.001$.

Table 1: Demographic characteristics of households in study area, (n=385)

Characteristics	Percent	Characteristics	Percent
Education level of head household		Source of livelihood	
None	12.50%	Crop sale	28.60%
Class 1-4	9.90%	Mixed farming	30.10%
Class 5-7	27.30%	Formal employment	9.40%
Completed primary	7.50%	Casual labor	10.90%
Secondary incomplete	28.30%	Business	11.70%
Completed secondary	5.50%	Sale of milk	4.90%
Tertiary	9.10%	Pension benefits	1.00%
		Children assistance	3.10%
		Begging	0.30%

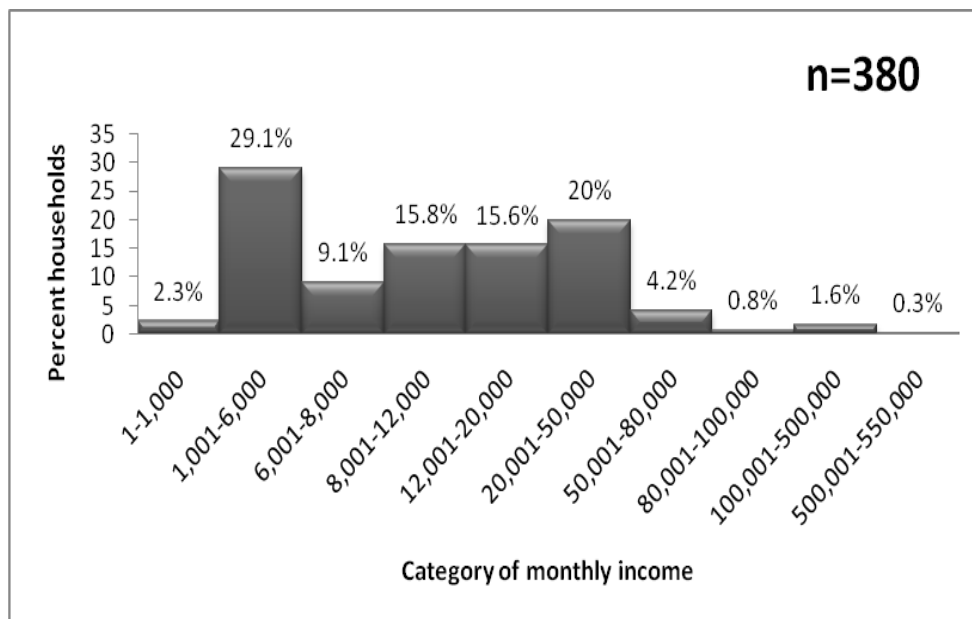


Figure 1: Category of household monthly income (KSh.)

Contribution of Pumpkin to Livelihood

This study determined the extent to which crops contributed to the income of the households. A total of 44.7% households did not get any income from crops (Figure 3). Majority of those who sold some crops earned quite a small amount of money; 39% of the farmers earned between KSh. 2,000 and KSh. 5,000 and only a negligible proportion earned above KSh. 50,000 from sale of crops.

Pumpkin was not among major crops cultivated for income generation in the study area, given that out of 275 (71.4%) farmers who reported growing pumpkin, only 4.2% were growing for sale.

In Figure 4, it is evident that the major crops grown for sale included maize, beans, tea, potatoes, cabbage, carrots, tomato, courgette, spices (dhania, onions) and French beans.

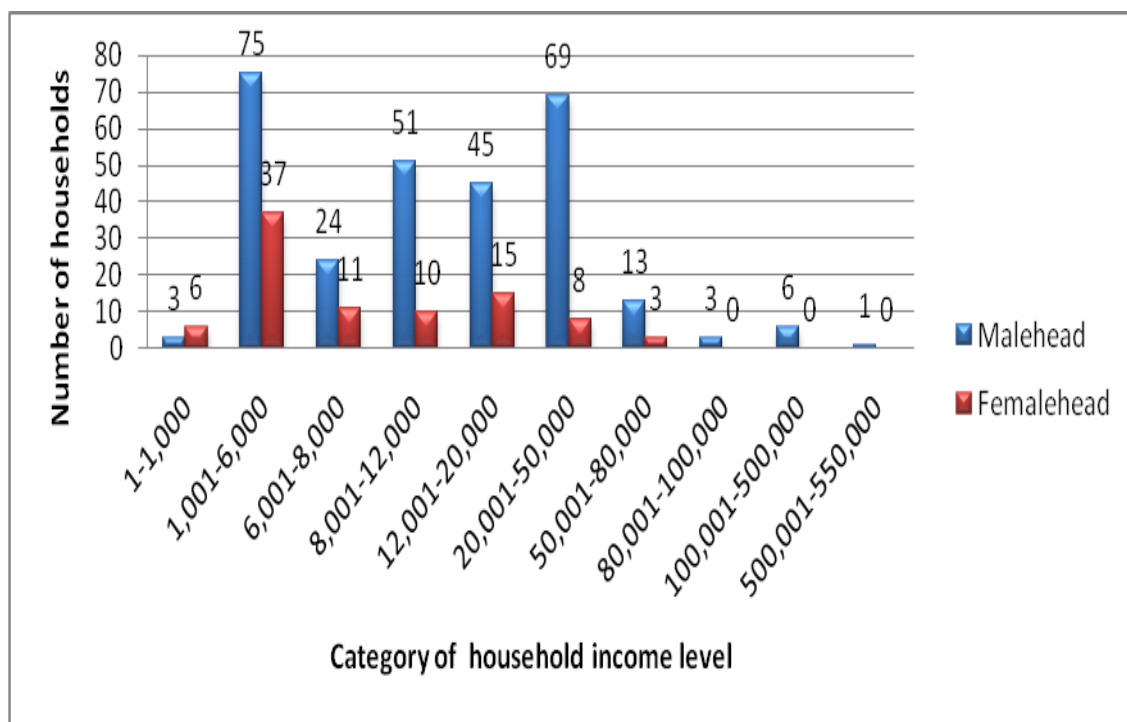


Figure 2: Category of household income level (KSh.) given the household head

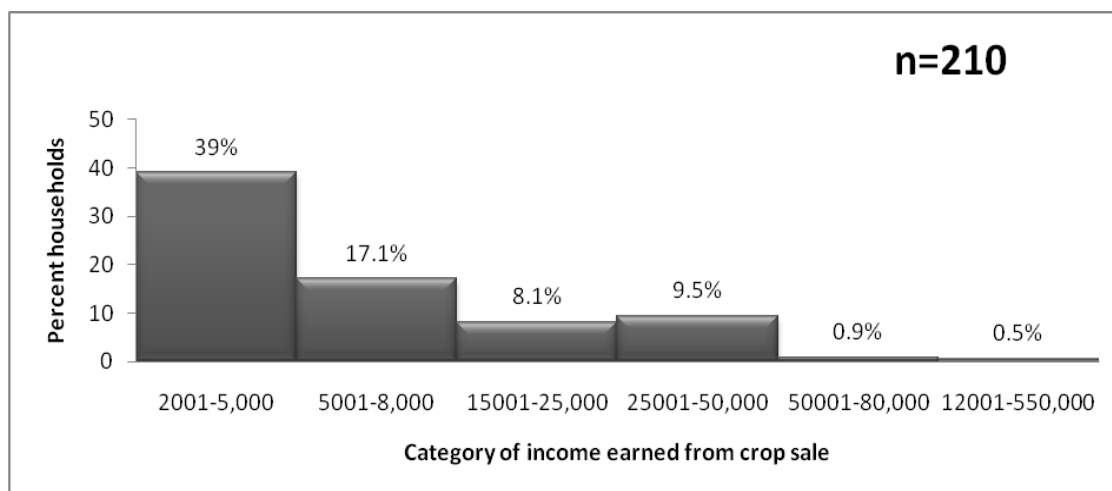


Figure 3: Category of income earned (KSh.) from crop sale by households

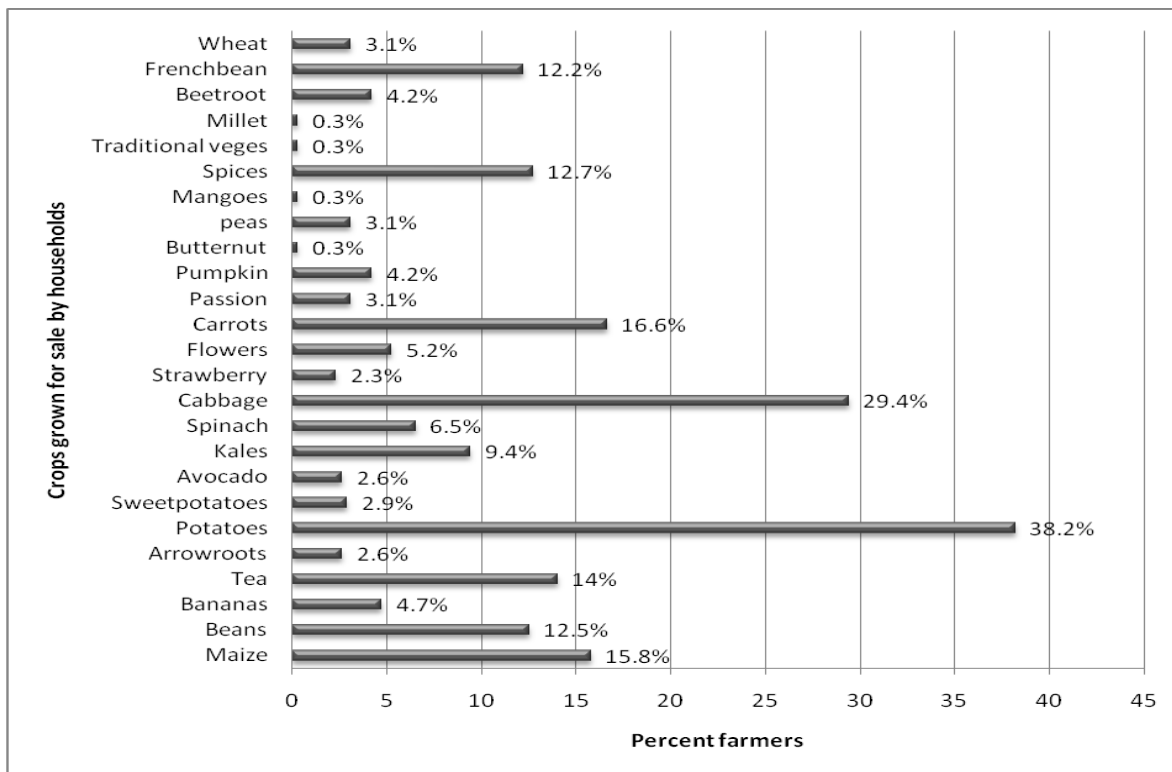


Figure 4: Crops grown for sale by farmers

Monthly income from sale of pumpkin fruits ranged from KSh. 150 to KSh. 12,000. Figure 5 shows that majority of farmers earned between KSh. 200 and KSh. 500. Whether a household sold pumpkin fruits or not was significantly related to the amount of money earned from sale of crops, χ^2 (N=382) = 35.82, $P=0.000$. In addition, the number of pumpkin

fruits harvested highly correlated with the monthly income from sale of pumpkin fruits: r (15)=0.650, $P=0.009$. There was a high correlation between the number of pumpkin plants cultivated by the farmer and the monthly income received from sale of fruits: r (16)=0.510, $P=0.043$.

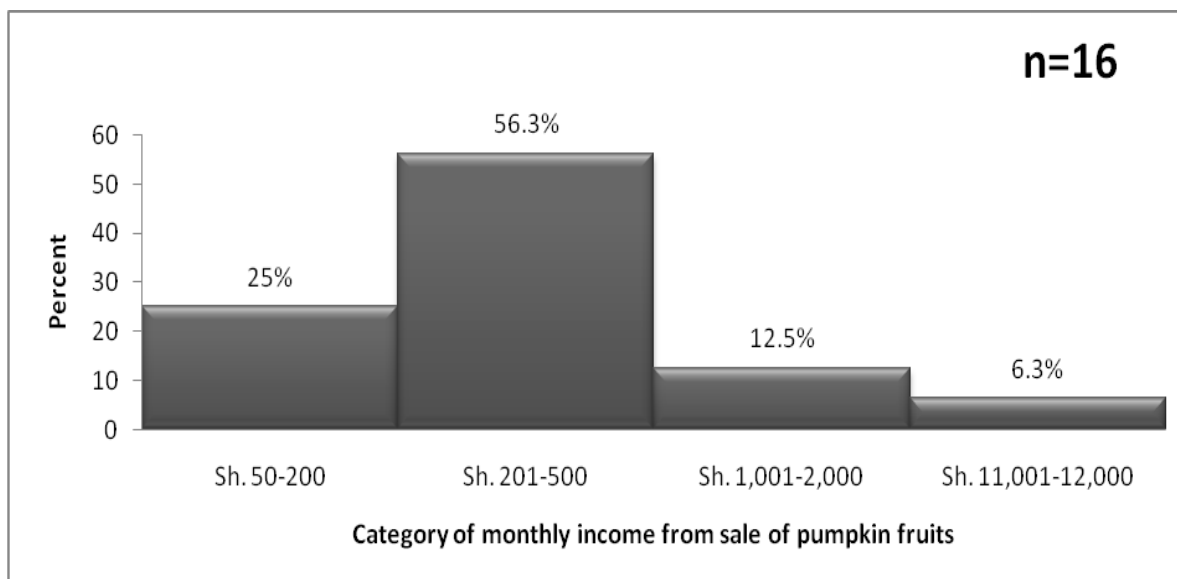


Figure 5: monthly income from sale of pumpkin fruits by farmers

DISCUSSION

The sampled households had a mean household size slightly lower than the Kenyan mean of 4.2 in 2008/09 KDHS report, and 4.4 in the 2003 KDHS. The mean household size was close to the fertility reported in the area of 4.6 births per woman, and reflected a decline due to the trend of declining fertility rates over the decades, down from 8.1 births per woman in the late 70's. Same report is found in Kenya's 2013 Economic report which indicates falling fertility rates (KER, 2013).

A significant number of households are illiterate in that they have never had any formal education. Education level has a great impact on the socio-economic status of an individual or household. This study showed a significant relationship between education level of household head and amount of monthly income. Normally a higher education level leads to better career opportunities and incomes (KER, 2013).

Households in the study area appeared to be mainly of low socio-economic class, with more than half (56.3%) of them earning KSh. 12,000 and below. Whether a household is male-headed or female-headed has an impact on issues such as socio-economic status, which in turn determine accessibility of basic needs such as food, education, health and other wellbeing of family members. None of the female-headed households were in the highest socio-economic status earning KSh. 80,000 and above. Some male-headed households earned KSh. 550,000 per month, while none of female-headed households earned any amount close to that (Muendo and Tschirley, 2004).

Among agricultural zones, sale of crops plays a major role in enhancing economic status of most households, especially because majority of the population in such zones rely on farming and not on white collar jobs. In addition, whether a farmer plants just a few or a large number of plants of a given crop would have some impact, for example when considering the benefits accrued from the crop. Such benefits would include health and nutrition due to adequate consumption of fresh produce from the farm, as well as economic since a farmer who grows just a few stems would only get meager returns, while one who has a large plantation would earn much more from sales. A food crop would benefit a farmer much more if they planted many crops as opposed to planting just a few stems of the crop. The latter would not even harvest enough for the family to have adequate food to eat (Ondigi *et al.*, 2008).

Majority of farmers in the study area (30.1%) relied on mixed farming for a livelihood, while another considerable proportion (28.6%) relied on crop sale alone. The population in study area largely depended on agriculture for economic sustenance, given the small proportion of households (9.4%) who relied on formal employment. Generally, almost half of the farmers did not rely on sale of any farm produce to earn a living. A good number of those who sold some crop produce earned an insignificant amount of between KSh. 2,000 and KSh. 5,000 per month. Specifically, pumpkin fruit contributed very little to households' income whereby out of the 4.2% growing and selling pumpkin fruits, more than half of them received between KSh. 201 and KSh. 500 monthly and only one farmer reported earning KSh. 12,000 monthly from sale of pumpkin fruits. A significant relationship between the amount of income from sale of crops and if a household was selling pumpkin fruits means that pumpkin was a common crop for sale among farmers who were earning more from agricultural produce (Muendo and Tschirley, 2004).

CONCLUSION AND RECOMMENDATION

Pumpkin farming is not intensive because although majority of farmers (71.4%) grow pumpkins, most of them (73.1%) cultivate about 5 plants or less per year, with the highest proportion harvesting between 1 to 53 fruits. Pumpkin growing is not done commercially, considering that only 4.2% of farmers grow it for sale. Pumpkin is neither a major crop nor does it have any significant contribution to household income (Ondigi *et al.*, 2008). The amount of income from sale of pumpkin fruits is highly dependent on the level of pumpkin cultivation by the farmer. Improving marketability of pumpkin fruit could increase its demand hence increase the level of cultivation. Pumpkin is a drought-resistant crop which can be tapped as a means of improving food security, as well as income generation through selling its vegetables, fruits and processed products. This way it will contribute to improvement of human nutrition and health status, as well as the economy of Kenyan households.

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